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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT INVESTIGATIONS

# MATSUCOCCUS STUDIES

## Relation of Matsucoccus Scale to Flagging Injury on Ponderosa Pine on the Prescott National Forest.

by
Howard L. McKenzie
Berkeley, California
July 19, 1938

U. S. GOVERNMENT PRINTING OFFICE 60918

# MATSUCOCCUS STUDIES

Relation of Matsucoccus Scale to Flagging Injury on Ponderosa Pine on the Prescott National Forest.

## INTRODUCTION

The memorandum of May 19, 1938, titled "Flagging of Artificially Infested Trees in the Wolf Creek Plot 1", included random counts of Matsucoccus scale from material collected from the Lynx Creek Area. At that time, the counts from only 34 twigs were tabulated, and as was indicated in the report, further investigations along this line were being carried out. The preliminary data included in that memorandum indicated quite conclusively that a direct correlation existed between a heavy scale population density and flagging.

The twigs used for this study were collected and handled in the same manner as was discussed in the above noted memorandum - namely, clipping and carefully examining and counting under the binocular microscope the Matsucoccus scale population on the second years growth, e.g., 1936 internode.

## DISCUSSION

The green and flagged twigs infested with Matsucoccus scale were selected at random from the same tree and whenever possible, from the same branch so as to obtain comparable twigs for a given length class. The population counts were recorded on a mimeographed form. Sufficient data were obtained for the object of this study with a total of 299 individual twigs being examined and compiled in Table I. It is not believed that further statistical work will modify the trends shown in this table.

Table I is a compilation of the scale counts. The headings are quite selfexplanatory; however, attention is invited to the columns "alive and dead" under the Average 1936 Internode Population Count. These two columns refer to the condition of the Matsucoccus scale on green and flagged twigs. The reason for such data was motivated by observations of numerous dead preadult scales on flagged twigs compared to those on green. The classification of alive and dead scale was not begun until the study was partly underway, consequently the values cited in the "alive and dead" column under Number of Twigs Involved is less that the "total" under the same heading. It foregoes to say that values cited under "Average 1936 Internode Population Count" have been duly weighted by the actual number of twigs involved.

In the memorandum of May 19, 1938, attention was called to the abundance of needles present on green twigs as compared to those that had flagged. This is due to the dying and gradual sloughing off of the needles as well as the handling of the dried twigs for the experimental counts. Since the majority of the scale settle under the bract enclosing the needle base it seemed advisable to account for this fact in this study. Casual observations of the normal green internodes indicate that the greater percent of these have apparently 75% of the surface supporting needles. A few only are covered entirely with needles. It is reasonable to assume, then, that the internodes covered from 70 to 100 percent with needles is normal for the internodes observed. This value of percent needles present has been included i in the last column of Table I.

## CONCLUSIONS

The data included in this report show that:

1. The population density on flagged twigs is over twice that on green twigs - i.e. the 5 inch class flagged possesses an average of 53.0 scale, whereas in the same class green, only 18.5 scale occurs. (This difference is minimized by the number of dead scale that have sloughed off with the needles on flagged twigs as well as the handling of the dried twigs prior to counting.)
2. Flagging contributes to a high mortality of Matsucoccus scale - i.e. the 5 inch class flagged possesses an average of 48.7 dead scale whereas in the same class green, only 3.9 dead scale occurs.

On the basis of the above conclusions it is reasonable to assume that:

1. Flagging is the result of a high population density of Matsucoccus scale, and,
2. Flagging is a contributing factor to the natural control of Matsucoccus scale thus accounting for the fluctuations of flagging throughout successive years.

Howard L. McKenzie
Assistant Entomologist

Berkeley, California
July 19, 1938.

TABLE I.

MATSUCOCCUS POPULATION RANDOM COUNTS
Grouped by 1936 Internode Length Classes

| Area | | | Average | Average | No. Twigs Involved | | Average 1936 Internode Pop. Count | | | | | | Percent Needles Present per Total Internode | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Green Twigs | | | Flagged Twigs | | | | |
| Lynx Creek | Groom Creek | Copper Basin | Length Class(in.) | Diameter (inches) | Alive & Dead | Total | Alive | Dead | Total | Alive | Dead | Total | | |
| 9* | 21 | 3 | 1.2 | .3 | 288 | 33 | 7.5 | 2.4 | 10.1 | | | | 85 | (16)* |
| 2 | 15 | 3 | .9 | .4 | 20 | 20 | | | | 1.1 | 18.3 | 19.3 | 23 | ( 8) |
| 16 | 7 | 6 | 2.0 | .2 | 28 | 29 | 12.3 | 2.9 | 14.7 | | | | 87 | (10) |
| 7 | 9 | 4 | 2.1 | .3 | 20 | 20 | | | | 2.1 | 27.9 | 30.0 | 39 | (13) |
| 11 | 11 | 9 | 3.0 | .3 | 31 | 31 | 11.5 | 3.5 | 15.1 | | | | 70 | (15) |
| 17 | 14 | 12 | 3.0 | .3 | 42 | 43 | | | | 2.4 | 31.2 | 32.8 | 24 | (18) |
| 7 | 2 | 3 | 4.0 | .3 | 12 | 12 | 15.4 | 4.4 | 20.0 | | | | 78 | ( 3) |
| 13 | 5 | 6 | 4.0 | .3 | 22 | 24 | | | | 3.0 | 33.2 | 35.5 | 24 | (10) |
| 13 | 1 | 6 | 5.0 | .5 | 19 | 20 | 14.7 | 3.9 | 18.5 | | | | 89 | ( 7) |
| 5 | 3 | 4 | 5.0 | .5 | 12 | 12 | | | | 4.2 | 48.7 | 53.0 | 23 | ( 5) |
| 6 | 9 | | 6.0 | .5 | 13 | 15 | 16.9 | 3.1 | 20.4 | | | | 62 | ( 5) |
| 7 | 7 | 3 | 6.0 | .5 | 15 | 17 | | | | 2.8 | 57.1 | 63.2 | 20 | ( 3) |
| | 3 | 1 | 7.0 | .6 | 4 | 4 | 14.0 | 6.7 | 21.0 | | | | 90 | ( 2) |
| 2 | 2 | | 7.0 | .5 | 4 | 4 | | | | 1.0 | 92.0 | 93.0 | | |
| | 1 | | 8.0 | .5 | 1 | 1 | 22.0 | 4.0 | 26.0 | | | | 80 | ( 1) |
| 1 | 3 | | 8.0 | .5 | 4 | 4 | | | | 4.5 | 75.5 | 80.0 | | |
| | 2 | | 9.0 | .4 | 2 | 2 | 20.0 | 10.5 | 30.5 | | | | 80 | ( 1) |
| | 1 | | 9.0 | .3 | 1 | 1 | | | | 1.0 | 40.0 | 41.0 | | |
| | 4 | | 10.0 | .7 | 4 | 4 | 24.5 | 7.5 | 32.0 | | | | 90 | ( 2) |
| | 3 | | 10.0 | .8 | 3 | 3 | | | | 6.7 | 61.0 | 68.3 | | |
| Total No. Twigs - Green | | | | | | 151 | | | | | | | | |
| Flagged | | | | | | 148 | | | | | | | | |
| | | | | | | 299 | | | | | | | Green - 80% | |
| | | | | | | | | | | | | | Flagged - 27% | |
| Average of Population Totals from Work Sheets | | | | | | | 12.8 | 3.6 | 16.3 | 2.5 | 37.1 | 39.8 | | |

* Number of Twigs.

Note:- Length classes include .5± for any inch; i.e., the 2" class would include all values from 1.6 to 2.5.